



Dr. Jennifer McCormick
Superintendent of Public Instruction

Working Together for Student Success

Science and Engineering Process Standards (SEPS)		Content Connector
SEPS.1 Posing questions (for science) and defining problems (for engineering)	A practice of science is posing and refining questions that lead to descriptions and explanations of how the natural and designed world(s) work and these questions can be scientifically tested. Engineering questions clarify problems to determine criteria for possible solutions and identify constraints to solve problems about the designed world.	A practice of science is posing and refining questions that lead to descriptions and explanations of how the natural and designed world(s) work and these questions can be scientifically tested. Engineering questions clarify problems to determine criteria for possible solutions and identify constraints to solve problems about the designed world.

<p>SEPS.2 Developing and using models and tools</p>	<p>A practice of both science and engineering is to use and construct conceptual models that illustrate ideas and explanations. Models are used to develop questions, predictions and explanations; analyze and identify flaws in systems; build and revise scientific explanations and proposed engineered systems; and communicate ideas. Measurements and observations are used to revise and improve models and designs. Models include, but are not limited to: diagrams, drawings, physical replicas, mathematical representations, analogies, and other technological models.</p> <p>Another practice of both science and engineering is to identify and correctly use tools to construct, obtain, and evaluate questions and problems. Utilize appropriate tools while identifying their limitations. Tools include, but are not limited to: pencil and paper, models, ruler, a protractor, a calculator, laboratory equipment, safety gear, a spreadsheet, experiment data collection software, and other technological tools.</p>	<p>A practice of both science and engineering is to use and construct conceptual models that illustrate ideas and explanations. Models are used to develop questions, predictions and explanations; analyze and identify flaws in systems; build and revise scientific explanations and proposed engineered systems; and communicate ideas. Measurements and observations are used to revise and improve models and designs. Models include, but are not limited to: diagrams, drawings, physical replicas, mathematical representations, analogies, and other technological models.</p> <p>Another practice of both science and engineering is to identify and correctly use tools to construct, obtain, and evaluate questions and problems. Utilize appropriate tools while identifying their limitations. Tools include, but are not limited to: pencil and paper, models, ruler, a protractor, a calculator, laboratory equipment, safety gear, a spreadsheet, experiment data collection software, and other technological tools.</p>
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<p>SEPS.3 Constructing and performing investigations</p>	<p>Scientists and engineers are constructing and performing investigations in the field or laboratory, working collaboratively as well as individually. Researching analogous problems in order to gain insight into possible solutions allows them to make conjectures about the form and meaning of the solution. A plan to a solution pathway is developed prior to constructing and performing investigations. Constructing investigations systematically encompasses identified variables and parameters generating quality data. While performing, scientists and engineers monitor and record progress. After performing, they evaluate to make changes to modify and repeat the investigation if necessary.</p>	<p>Scientists and engineers are constructing and performing investigations in the field or laboratory, working collaboratively as well as individually. Researching analogous problems in order to gain insight into possible solutions allows them to make conjectures about the form and meaning of the solution. A plan to a solution pathway is developed prior to constructing and performing investigations. Constructing investigations systematically encompasses identified variables and parameters generating quality data. While performing, scientists and engineers monitor and record progress. After performing, they evaluate to make changes to modify and repeat the investigation if necessary.</p>
<p>SEPS.4 Analyzing and interpreting data</p>	<p>Investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists and engineers use a range of tools to identify the significant features in the data. They identify sources of error in the investigations and calculate the degree of certainty in the results. Advances in science and engineering makes analysis of proposed solutions more efficient and effective. They analyze their results by continually asking themselves questions; possible questions may be, but are not limited to: “Does this make sense?” “Could my results be duplicated?” and/or “Does the design solve the problem with the given constraints?”</p>	<p>Investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists and engineers use a range of tools to identify the significant features in the data. They identify sources of error in the investigations and calculate the degree of certainty in the results. Advances in science and engineering makes analysis of proposed solutions more efficient and effective. They analyze their results by continually asking themselves questions; possible questions may be, but are not limited to: “Does this make sense?” “Could my results be duplicated?” and/or “Does the design solve the problem with the given constraints?”</p>

<p>SEPS.5 Using mathematics and computational thinking</p>	<p>In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Scientists and engineers understand how mathematical ideas interconnect and build on one another to produce a coherent whole.</p>	<p>In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Scientists and engineers understand how mathematical ideas interconnect and build on one another to produce a coherent whole.</p>
<p>SEPS.6 Constructing explanations (for science) and designing solutions (for engineering)</p>	<p>Scientists and engineers use their results from the investigation in constructing descriptions and explanations, citing the interpretation of data, connecting the investigation to how the natural and designed world(s) work. They construct or design logical coherent explanations or solutions of phenomena that incorporate their understanding of science and/or engineering or a model that represents it, and are consistent with the available evidence.</p>	<p>Scientists and engineers use their results from the investigation in constructing descriptions and explanations, citing the interpretation of data, connecting the investigation to how the natural and designed world(s) work. They construct or design logical coherent explanations or solutions of phenomena that incorporate their understanding of science and/or engineering or a model that represents it, and are consistent with the available evidence.</p>



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<p>SEPS.7 Engaging in argument from evidence</p>	<p>Scientists and engineers use reasoning and argument based on evidence to identify the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation, the process by which evidence-based conclusions and solutions are reached, to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims.</p>	<p>Scientists and engineers use reasoning and argument based on evidence to identify the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation, the process by which evidence-based conclusions and solutions are reached, to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims.</p>
<p>SEPS.8 Obtaining, evaluating, and communicating information</p>	<p>Scientists and engineers need to be communicating clearly and articulating the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations, as well as, orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs.</p>	<p>Scientists and engineers need to be communicating clearly and articulating the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations, as well as, orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs.</p>

Fifth Grade Science Standards



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Physical Science (PS)	Content Connector
5.PS.1 Describe and measure the volume and mass of a sample of a given material.	5.PS.1.a.1 Describe and measure the volume of a sample of a given material.
	5.PS.1.a.2 Describe and measure the mass of a sample of a given material.
5.PS.2 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass)	5.PS.2.a.1 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass)
5.PS.3 Determine if matter has been added or lost by comparing mass when melting, freezing, or dissolving a sample of a substance. (Law of Conservation of Mass)	5.PS.3.a.1 Determine if matter has been added or lost by comparing mass when melting, freezing, or dissolving a sample of a substance. (Law of Conservation of Mass)
5.PS.4 Describe the difference between weight being dependent on gravity and mass comprised of the amount of matter in a given substance or material.	5.PS.4.a.1 Describe the difference between weight being dependent on gravity and mass comprised of the amount of matter in a given substance or material.

Earth and Space Science (ESS)	Content Connector
5.ESS.1 Analyze the scale of our solar system and its components: our solar system includes the sun, moon, seven other planets and their moons, and many other objects like asteroids and comets.	5.ESS.1.a.1 Identify and describe the components of our solar system: the sun, moon, seven other planets and their moons, and many other objects like asteroids and comets.

Fifth Grade Science Standards



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	5.ESS.1.a.2 Demonstrate the scale of our solar system: the sun, moon, seven other planets and their moons, and many other objects like asteroids and comets.
5.ESS.2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	5.ESS.2.a.1 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows.
	5.ESS.2.a.2 Represent data in graphical displays to reveal patterns of day and night.
	5.ESS.2.a.3 Represent data in graphical displays to reveal patterns of the seasonal appearance of some stars in the night sky.
5.ESS.3 Investigate ways individual communities within the United States protect the Earth's resources and environment.	5.ESS.3.a.1 Investigate ways individual communities within the United States protect the Earth's resources and environment.
5.ESS.4 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	5.ESS.4.a.1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Life Science (LS)	Content Connector
5.LS.1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	5.LS.1.a.1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Fifth Grade Science Standards



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5.LS.2 Observe and classify common Indiana organisms as producers, consumers, decomposers, or predator and prey based on their relationships and interactions with other organisms in their ecosystem.	5.LS.2.a.1 Observe and classify common Indiana organisms as producers, consumers, decomposers, or predator and prey based on their relationships and interactions with other organisms in their ecosystem.
5.LS.3 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	5.LS.3.a.1 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Engineering (E)	Content Connector
3-5.E.1 Identify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost.	3-5.E.1.a.1 Identify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost.
3-5.E.2 Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	3-5.E.2.a.1 Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3-5.E.3 Construct and perform fair investigations in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	3-5.E.3.a.1 Construct and perform fair investigations in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.